Technology Innovation Project

Project Brief

TIP 322: Development of a Predictive Reliability Test Method for Solid-State Luminaires, Light Engines, and Integral Lamps

Context

Lighting accounts for between 20 and 30 percent of electric energy use in the United States. The widespread use of LED lighting systems has the potential to reduce lighting energy use by 50 percent. For LED lighting systems to be accepted by the market however, they must be reliable and meet customer expectations and manufacturers' claims.

LED products are made up of many different components including LEDs, drivers, circuit boards, optics, thermal management devices, and other elements that are important to the overall reliability of the product.

Presently, the LED lighting industry lacks a standardized test method that can determine the accurate life of a complete LED system, such as an integral lamp, light engine, or luminaire.

Description

The project builds on work that the Lighting Research Center (LRC) has conducted over the past three years to develop a cost-effective, accelerated life test method that can predict the whole system life of LED luminaires, light engines, and integral lamps at any given environment temperature and system use pattern. The project allows the LRC to expand this work to a wider range of LED luminaire and lamp types, further validate the testing method developed, and move the method forward toward broad industry adoption and standardization.

Why It Matters

Some LED lighting manufacturers claim extremely long product lifetimes such as 100,000 to 200,000 hours, even though components such as drivers are likely to fail within 50,000 hours, and the failure rate is accelerated by high operating temperatures. A standardized test method is needed, to predict the lifetime of LED lighting products at various operating temperatures. For LED lighting products to gain broad market acceptance, consumers, specifiers, and BPA ratepayers need to feel confidence in their reliable performance. Therefore, the solid-state lighting industry needs a well-validated and robust test method that will truly estimate the life of a complete LED system.

This project helps to build customer confidence in LED product life and reliability, and speed market acceptance of this technology. This could result in significant annual energy savings and reduction in peak electric demand for BPA service territories.

Goals and Objectives

It is expected that when this study is completed, it will result in a proposed industry standard for timely and cost-effective testing of LED luminaires for life and color shift. This test method will allow manufactures to reliably determine the expected life of a solid-state lighting product within three months.

Deliverables

Project deliverables include:

- List of LED lighting products (e.g., luminaires, light engines) selected for testing during the project
- Schematic drawing of testing set-up and apparatus and list of equipment being used for testing
- Copy of all data collected during the project in electronic format
- Report of testing results and project findings
- Recommended testing method/protocol based on testing results with supporting documentation for movement forward through the technical committee process
- Final project report.

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Project Start Date: October 1, 2014

Project End Date: September 30, 2016

Reports & References (Optional)

Links

Estimating LED Life
http://www.lrc.rpi.edu/programs/solidstate/LEDLife.asp

Funding

Total Project Cost:	$709,372
BPA Share:	$353,853
External Share:	$355,519
BPA FY2015 Budget:	$207,112

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ASSIST (Alliance for Solid State Illumination Systems and Technologies)